

High Efficiency Specifications for Commercial Refrigerators and Freezers

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Efficiency Requirements for Qualifying Products

Maximum daily energy consumption requirements (kWh/day) for CEE Qualified Commercial Food-grade Refrigerators and Freezers.

Product Volume (cu. ft.)	Corresponding Base Specification	Refrigerator	Freezer
<i>Vertical Configuration</i>			
<i>Solid Door Cabinets</i>			
0 < V < 15	ENERGY STAR® Version 2.0	$\leq 0.089V + 1.411$	$\leq 0.250V + 1.250$
15 \leq V < 30	ENERGY STAR Version 2.0	$\leq 0.037V + 2.200$	$\leq 0.400V - 1.000$
30 \leq V < 50	ENERGY STAR Version 2.0	$\leq 0.056V + 1.635$	$\leq 0.163V + 6.125$
50 \leq V	ENERGY STAR Version 2.0	$\leq 0.060V + 1.416$	$\leq 0.158V + 6.333$
<i>Glass Door Cabinets</i>			
0 < V < 15	ENERGY STAR Version 2.0	$\leq 0.118V + 1.382$	$\leq 0.607V + 0.893$
15 \leq V < 30	ENERGY STAR Version 2.0	$\leq 0.140V + 1.050$	$\leq 0.733V - 1.000$
30 \leq V < 50	ENERGY STAR Version 2.0	$\leq 0.088V + 2.625$	$\leq 0.250V + 13.500$
50 \leq V	ENERGY STAR Version 2.0	$\leq 0.110V + 1.500$	$\leq 0.450V + 3.500$
<i>Chest Configuration</i>			
Solid or Glass Door Cabinets	ENERGY STAR Version 2.0	$\leq 0.125V + 0.475$	$\leq 0.270V + 0.130$

Note: V = AHAM volume in cubic feet.

Mixed Solid/Glass Door Cabinets

This section applies to mixed solid/glass door cabinets designed with two or more compartments contained in a single cabinet with different exterior door types (i.e., one is glass and one is solid) on the same side of the cabinet. The maximum daily energy consumption (MDEC) of mixed solid/glass door cabinets shall be the sum of all individual compartment MDEC values. For purposes of mixed solid/glass door cabinets, compartments are defined by the volume associated with the different exterior door types. The interior of these compartments may or may not be physically separated.

The volume of each individual compartment shall be measured, and its MDEC limit determined, based on the compartment's volume and door type, as listed in the efficiency requirements. The sum of the volumes of each compartment must be equivalent to the total AHAM volume of the cabinet.

Example: Consider a vertically-configured refrigeration cabinet with a total volume of 50 cubic feet with one glass half door and one solid half door on the same side. The maximum daily energy consumption (MDEC) of the equipment would be the sum of the MDEC for the two compartments. The requirement used to calculate the MDEC for each compartment is based on the compartment's volume and door type:

Glass Door MDEC: (25 cu. ft. X 0.140) + 1.050 = 4.550 kWh/day

Solid Door MDEC: (25 cu. ft. X 0.037) + 2.200 = 3.125 kWh/day

MDEC for entire cabinet: 4.550 kWh/day + 3.125 kWh/day = 7.675 kWh/day

Definitions

- A. Commercial Food-grade Refrigerator: A refrigeration cabinet designed for storing food products at temperatures above 32 degrees Fahrenheit (F) but no greater than 40 degrees F and intended for commercial use.
- B. Commercial Food-grade Freezer: A refrigeration cabinet designed for storing food products at temperatures of 0 degrees F and intended for commercial use.
- C. Refrigeration Cabinet: A refrigerator or freezer used for storing food products at specified temperatures, with the condensing unit and compressor built into the cabinet, and designed for use by commercial or institutional facilities, other than laboratory settings. These units may be vertical or chest configurations and may contain a worktop surface.
- D. Closed Refrigerator: A display or holding refrigerator where product is accessible for removal by opening or moving doors or panels.¹
- E. Solid Door Cabinet: A commercial food-grade refrigerator or freezer in which all outer doors on all sides of the unit are solid doors. These doors may be sliding or hinged.
- F. Glass Door Cabinet: A commercial food-grade refrigerator or freezer in which all outer doors on at least one side of the unit are glass doors. These doors may be sliding or hinged.
- G. Mixed Solid/Glass Door Cabinet: A commercial food-grade refrigerator or freezer in which all outer doors on at least one side of the unit are a combination of solid and glass doors. A unit which has all glass doors on one side and a combination of solid and glass doors on another is considered a glass door cabinet.
- H. Solid Door: Less than 75% of the front surface area is glass.
- I. Glass Door: Greater than, or equal to, 75% of the front surface area is glass.
- J. Worktop Surface: A solid working surface. The working surface may be a cutting board, a stainless steel work surface, or a stone slab. This surface cannot add to the total energy consumption of the unit.
- K. Chest Configuration: An enclosed refrigeration cabinet to which access is gained only through a top-opening door.

¹ Definition from ANSI/ASHRAE Standard 72-2005, Method of Testing Commercial Refrigerators and Freezers, American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. 2005.

Test Procedure Requirements

L. AHAM Volume: The interior volume of a refrigerator as calculated by AHAM Standard Household Refrigerators/Household Freezers (ANSI/AHAM HRF-1-2004).²

M. Integrated Average Product Temperature: The integrated average of all test package temperatures, recorded at 15-minute intervals, as determined by the test method referenced in Section 4, Test Criteria.

Referenced Standards Organizations

N. AHAM: Association of Home Appliance Manufacturers.

O. AHRI: Air-Conditioning, Heating and Refrigeration Institute

P. ANSI: American National Standards Institute.

Q. ASHRAE: American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc.

R. NSF: NSF International.

S. UL: Underwriters Laboratories, Inc.

Qualifying Products

For the purposes of CEE, only those products that meet definitions 1A through 1G above are eligible for qualification. Examples of product types that may be eligible for qualification include: reach-in, roll-in, or pass-through units; merchandisers; undercounter units; milk coolers; back bar coolers; bottle coolers; glass frosters; deep well units; beer-dispensing or direct draw units; and bunker freezers.

Drawer cabinets, prep tables, deli cases, and open air units are **not** eligible for qualification under this specification.

Note: This specification is intended for commercial food-grade refrigeration equipment only. Laboratory-grade refrigeration equipment cannot qualify under this specification.

Solid and glass door refrigerators and freezers qualifying under this specification must be **third-party certified** to applicable requirements set forth in the following quality and safety standards:

(1) ANSI/NSF International Standard for Food Equipment - Commercial Refrigerators and Freezers (ANSI/NSF 7-2007); and

(2) UL Standard for Commercial Refrigerators and Freezers (UL-471).

Note: ANSI/NSF 7-2007 exempts equipment from some temperature performance requirements based on the type of food that is intended to be stored in the unit. Examples of equipment that would be exempt from the temperature performance requirements of this Standard include: refrigerators intended only for the storage or display of non-potentially hazardous bottled or canned products and refrigerators intended only for the display of unprocessed produce. Please refer to ANSI/NSF 7-2007 to determine the applicable requirements for a specific equipment type.

Note: CEE plans to reference the ENERGY STAR qualified products list for as long as the ENERGY STAR list remains relevant to this specification and meets CEE member needs. Manufacturers should submit product information directly to ENERGY STAR for qualification.

² Definition from ANSI/ASHRAE Standard 72-2005, Method of Testing Commercial Refrigerators and Freezers, American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. 2005.

Test Methods

Manufacturers are required to perform tests and self-qualify those product models that meet the CEE guidelines. Energy consumption shall be tested and stated in accordance with AHRI Standard 1200-2008 “Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets,” which references ANSI/ASHRAE Standard 72-2005, “Method of Testing Commercial Refrigerators and Freezers,” in 0.01 kWh per day increments. In measuring energy consumption, the following test standards and additional conditions must be met:

A. **Testing Temperature:** Manufacturers must use AHRI Standard 1200-2008, which references ANSI/ASHRAE Standard 72-2005, to measure the daily energy consumption of commercial food-grade refrigerators and freezers using the temperature specifications listed below.

Temperature Specifications for Testing	
Commercial food-grade refrigerator	38 degrees ± 2 degrees F
Commercial food-grade freezer	0 degrees ± 2 degrees F

B. **Additional Testing Conditions:** Only those test procedures in AHRI 1200-2008 relevant to *closed refrigerators* are applicable to this specification. Manufacturers should report the total energy consumption of the product, which includes both the auxiliary energy and refrigeration energy consumption. In addition, equipment must be tested according to AHRI 1200-2008:

- With all standard, factory-installed accessories (lighting, perimeter heat, pan heater, etc.) in the “ON” position, if manually-controlled.
- With all accessories, such as electric condensate pans, that come standard with equipment, but not necessarily factory-installed, installed and in the “ON” position.

C. **Power Management Devices:** Equipment with energy management devices permanently installed, such that the operator is not able to adjust the settings, may be operational during the test period, if the energy management device will never change to a new integrated average product temperature after the test has been concluded. Manufacturers should refer to AHRI 1200-2008 and ANSI/ASHRAE Standard 72-2005 and their official interpretations for further guidance on power management devices.

D. **Acceptable Testing Sources:** Test reports will only be accepted from a Commercial Refrigeration Testing Laboratory that:

1. Is approved by the California Energy Commission Appliance Efficiency Program. A list of approved labs is available at <http://www.energy.ca.gov/appliances/forms>.

OR

2. Provides data that is verified by a certification body, which is accredited by the Standards Council of Canada. **Note:** this approval process is identical to the requirements for Natural Resources Canada. A list of accredited certification bodies may be found at <http://www.oee.nrcan.gc.ca/regulations/guide.cfm>, in the section titled Energy Efficiency Verification Mark.

Future Specification Revisions

CEE reserves the right to revise the specification as appropriate.